Two objects in a virtual reality world may be assigned as connected hierarchically. The hierarchy is created by selecting an object and designating it as a child object of another object.

Objects additionally can be assigned as rotatable about a portion of another object. This is necessary only if the part is unconstrained in some way. For instance, a door needs to rotate about one of its edges. To define a rotational constraint of motion for an object, the edge about which an object will rotate is selected. The origin will be set to the center of the edge if a line segment is selected, or the origin will be set to the center point of the defining endcap of a column if a column is selected. For example, to allow a faucet arm to swing side to side, an origin must be specified, and then the minimum and maximum constraint values must be set. Once an object or a grouped object has been designated as rotatable about an origin, a change in an angle of rotation will cause the selected object to rotate about the origin by the specified amount.--

IN THE CLAIMS

Please cancel Claims 8 and 9 without prejudice.

Please amend Claims 1-3 as follows:

--1. (Twice Amended) An apparatus for creating a virtual world data base, comprising:

receiving means for receiving [a pictorial representation] first, second and third polygon

representations of respective first, second and third virtual objects in a [the] virtual world;

selecting means, coupled to said receiving means, for selecting a first edge of said first virtual object and for selecting a second edge of said second virtual object; and

grouping means, coupled to the receiving means and the selecting means, for grouping [descriptions of the pictorial representation of] said first and second virtual objects in the virtual world into a grouped object comprising said first and second virtual objects joined at an intersection of the first and second edges, the grouped object represented by [selected groups of] at least one of a three-dimensional and rotatable wireframe [objects] object and a three-dimensional and rotatable sweep polygon [objects].

2. (Amended) The apparatus according to claim 1 further comprising attribute assigning means, coupled to the grouping means, for assigning an attribute [attributes] to the first and second edges of the first and second virtual objects [groups], the attribute means including hierarchy means for [selecting] assigning a grouping hierarchy for the [selected groups] first and second virtual objects wherein the second virtual object is assigned as a child object of the first virtual object and wherein an orientation and a position of the child object is calculated relative to the first virtual object.

3. (Amended) The apparatus according to claim 2 wherein the attribute assigning means further comprises:

origin assigning means for assigning an origin on the first virtual object around which the third virtual object can rotate; and

constraint assigning means for assigning [constraints] a three-dimensional constraint of motion to the [groups] the third virtual object to constrain how the third virtual object can rotate with respect to the first virtual object.--

Claim 4, line 3, change "groups" to --grouped object--.

Claim 5, line 3, change "groups" to --grouped object--.

Claim 6, line 3, change "groups" to --grouped object--.

Please amend Claim 7 as follows:

--7. (Twice Amended) An apparatus for creating a virtual world comprising:

receiving means for receiving [a pictorial representation] first, second and third polygon representations of respective first, second and third virtual objects in [the] a virtual world;

selecting means, coupled to said receiving means, for selecting a first edge of a first virtual object and for selecting a second edge of a second virtual object; and

grouping means, coupled to the receiving means and the selecting means, for grouping [descriptions of the pictorial representation of] said first and second virtual objects in the virtual world into [selected groups of] a grouped object comprising said first and second virtual objects joined at an intersection of the first and second edges, the grouped object represented by at least one of a three-dimensional and

rotatable wireframe [objects] object and a three-dimensional and rotatable sweep polygon [objects];

attribute assigning means, coupled to the grouping means, for assigning [attributes] an attribute to the first and second edges of the first and second virtual objects [groups], the attribute assigning means including:

hierarchy means for [selecting] assigning a grouping hierarchy for the [selected groups] first and second virtual objects wherein the second virtual object is assigned as a child object of the first virtual object and an orientation and a position of the child object is calculated relative to the first virtual object; and

origin assigning means for assigning an origin on the first virtual object around which the third virtual object can rotate; and

constraint assigning means for assigning [constraints] a three-dimensional constraint of motion to the [groups] the third virtual object to constrain how the third virtual object can rotate with respect to the first virtual object; and

rendering means for rendering the virtual world [from] including the [groups] grouped object.--

Please add new Claims 11 and 12 as follows:

--~~11~~ 4. The apparatus of Claim 3, wherein the constraint assigning means comprises means for specifying a minimum angle and a maximum angle that said third virtual object can rotate with respect to said origin.